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ABSTRACT

Commenting on Kingsley Davis' paper, "Population Policy: Will Current Programs Succeed?", the author discusses the problem of rapid population growth in the low-income countries. Research strategy should focus on the family or small community to trace environmental constraints and opportunities influencing desired and achieved fertility, and possibly isolating the additional contribution family planning programs make to the decline of fertility. In disagreement with Davis, the author finds that fertility and child mortality rates are related; parents frame their family goals on numbers of surviving children. Once these goals have been reached, they exercise birth control. In developing countries, improvements in child nutrition and local health facilities might reduce infant and child mortality, and therefore birth rates, within a decade. Modification of education, employment, and welfare policies might also move parents toward smaller surviving family size goals. (Author/AWW)

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THE CHANGING BALANCE OF BIRTHS AND DEATHS: A COMMENT

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Professor Davis has alluded to one of the frustrating facts of life in international demographic research: in low income countries where rapid population growth appears to constitute the greatest hardship, we know the least about the magnitude of the problem and know all too little about its causes and its consequences. We are therefore indebted to Professor Davis for a thoughtful survey of historical evidence of demographic trends, a detailed discussion of developments in the twentieth century, and his own judgments of what is occurring today and what is in store for us in the future. In general, I am in relatively close agreement with his interpretation of the past, and in any case I have neither the demographer's credentials nor the experience to quibble about detail. I would prefer, therefore, to accept Professor Davis' description of the past and present, and, instead, raise a further topic for discussion here — "What are the uneasy solutions?" And more basic for many of us who are committed to research in this area, "What demographic information or knowledge do we need to improve our policy response to the evident problem of rapid population growth in the low income countries?"

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*Any views expressed in this paper are those of the author. They should not be interpreted as reflecting the views of The Rand Corporation or the official opinion or policy of any of its governmental or private research sponsors. Papers are reproduced by The Rand Corporation as a courtesy to members of its staff. These comments were presented at a conference at the California Institute of Technology of May 6, 1970 on the paper of Professor Kinsley Davis, "The Changing Balance of Births and Deaths" to appear as Chapter 1 in Technological Change and Population Growth, New York: Viking Press, 1971.

Aside from emotional appeal, and there is much of that today, of what practical use is the fact that populations double in 21 rather than 23 years, or that the rate of population growth in country X is 3.3 rather than 3 percent per year? I wonder if this type of information about substantial changes in the magnitudes of population growth really elicits different policy responses. I suspect not. What the policymaker needs to know, rather, is why birth rates are high, and how effective various policies at his disposal might be in reducing the level of birth rates and at what cost to other social objectives.

Trends over time at the national level do not provide us with evidence to infer that one policy or one program has affected the birth rate. Professor Davis himself, in his famous Science article of 3 years ago [1], challenged the advocates of family planning, contending that the decline of birth rates in Taiwan — the most famous example of a successful family planning program — had preceded the program and consequently, one could not infer that the program had contributed to this decline in fertility. I should like to take his argument one step further, and suggest that any single time series of a vital rate, or more appropriately age-standardized birth rates, cannot provide us with the statistical evidence to infer with confidence that any particular policy has influenced fertility. Many things change over time with the glacial speed that demographic variables do. Interpretation and analysis must dig deeper. We must get beyond these aggregate levels of vital rates and population growth. Regional trends in birth rates may provide us with stronger evidence

of which factors in particular regions accelerated the decline in birth rates and which factors are, on the other hand, supporting high levels of fertility observed elsewhere in low income countries.

Let me argue that the most promising research strategy we have at hand today is to focus on the family or small community and observe fertility from survey or census data, hopefully from reliable data, to trace variations in reproductive behavior among individuals and communities to the constraints and opportunities of the environment that would be expected to influence desired and achieved fertility. We must try to understand at the local level what contribution the environment is making to the observed reproductive behavior of women. Perhaps then we shall also be able to isolate what additional contribution local policies, such as a family planning program, are making to the decline of fertility. This research strategy may not allow us to conclude that the birth rate is 44 per 1,000 rather than 42 per 1,000 in the country as a whole, but it may permit us to infer what factors are likely to influence the birth rate, which way the birth rate is likely to go in the future, and by how much. Evidence accumulated in this fashion on the local determinants (correlates for those who are skeptical) of birth rates, will provide the basis for selecting among alternative policies those that will be most effective, or least costly in resources, in accomplishing a desired decline in birth rates.

One example will perhaps show how this research strategy can bring into focus somewhat different policy implications from those that have been widely publicized. In my own work, first in Puerto Rico, then in Taiwan, and several other countries, I have

tried to analyze fertility at the lowest administrative unit or at the family level, in order to understand cross-sectional variation in terms of environmental factors [2]. A widely held belief that is rarely tested with statistical rigor presumes that the decline in child death rates contributes to the decline in birth rates, for parents frame their family goals in terms of wanting a particular number of surviving children. This hypothesis led me to expect that I might explain some of the variation in fertility by the variation in child mortality. The positive partial correlation between these two variables was, for example, very strong in Taiwan in the 1960s. What was most notable is that if one considers death rates 2 to 4 years ago with current birth rates, the relationship becomes statistically much stronger and more significant. This 2 to 4 years is about the time it takes for a woman to replace a child if she has lost one. Some of this lag may be biological in nature — because when an infant dies and lactation stops, conception can proceed more promptly. But this lagged relationship is most strongly evident among older women, women who often have completed their ideal family size and are, perhaps, deciding whether to have another child on the basis of the survival of earlier offspring. Similar results have come out of other studies in the Philippines and Pakistan, environments with much lower income and higher mortality [3]. These results suggest, then, that the decline in mortality elaborated by Professor Davis is not independent of fertility; that, indeed, the decline in mortality sets up pressures on parents due to the increasing size of their surviving families which begin to work their way, pressing older women to try to find means to restrict

their fertility. This does not indicate that population growth is self-equilibrating. Not only are there more children surviving because of the improved regime of mortality, but there are also many more adults. Probably less than half the decline in crude death rates is accounted for by more children surviving to still-fertile parents. Consequently, the "population explosion" will still follow from the increased life expectancy for adults, but to the extent that it is related to improved child survival, it will create compensating pressures for a subsequent decline in fertility.

To demonstrate this and put in perspective some of the other issues Professor Davis has brought out in his paper, Table 1 simulates the consequences of the changes in mortality which are noted in the developing world. I postulate initially a world in which the population is annually growing 1.5 percent and death rates are related to standard life tables — very high mortality initially, level 8 of the West series of Coale and Demeny's model life tables [4]. This level of mortality declines in a decade to level 15, and in the next decade to level 17. This is about the magnitude of the decline in mortality witnessed in the low income world since World War II. If we assume no change in fertility by age, Case I unfolds as a mechanical deduction from our assumptions. These consequences are what we have observed taking place in the last decade or two. The rate of population growth increases to 2.65 percent per year and, if fertility does not fall, population growth rises eventually to 3 percent. But the surviving number of children parents have also rises and rises very sharply; within 20 years it has increased by more than 25 percent. The

Table 1. Population Simulations

Time	Crude Birth Rate	Crude Death Rate	Infant Death Rate	Population Growth Rate	Percent of Population Less Than 15 Years of Age	Average Number of Surviving Children per Woman by Age						
	(per 1,000)					15-19	20-24	25-29	30-39	35-39	40-44	45-49
Case I[a]												
0	40.5	25.5	195	15.0	38.5	0.36	1.21	2.14	2.81	3.15	3.18	3.08
10	38.7	12.7	98	26.5	40.5	0.40	1.34	2.37	3.06	3.36	3.33	3.18
20	37.5	10.1	73	28.1	41.9	0.40	1.41	2.59	3.45	3.83	3.76	3.52
30	38.5	10.1	72	29.0	42.2	0.40	1.41	2.61	3.56	4.08	4.18	4.00
40	38.9	10.0	72	29.6	42.9	0.40	1.41	2.62	3.56	4.12	4.29	4.25
Percentage Increase in Size of Surviving Family						11	17	22	27	31	35	38
Case II[b]												
0	40.5	25.5	195	15.0	38.5	0.36	1.21	2.14	2.81	3.15	3.18	3.08
10	37.5	12.6	98	25.3	40.2	0.40	1.33	2.34	3.01	3.32	3.32	3.18
20	35.1	10.0	73	25.6	40.5	0.40	1.40	2.50	3.23	3.57	3.59	3.44
30	35.8	10.2	72	26.1	40.1	0.40	1.40	2.51	3.28	3.66	3.75	3.67
40	35.6	10.1	72	26.0	40.5	0.40	1.40	2.52	3.28	3.67	3.78	3.75
Percentage Increase in Size of Surviving Family						11	16	18	17	17	19	22

Notes:

[a]Constant age specific fertility (m = 27). Source: [4], Table XIII, p. 30.

[b]Eighty-five percent reliable birth control is used when parents reach traditional desired surviving family size of 3.08 children and surviving family size is distributed normally about the mean with a standard deviation of half a child.

question is, "Are parents indifferent to having four surviving children rather than the traditional three?" I judge not. Using the empirical research I have reported as a basis for conjecturing behavioral patterns, I assume in case II that parents, once they reach their traditional surviving family size goal, exercise birth control which is 85 percent effective. A good family planning program might increase the effectiveness of birth control, however.

Given this assumption, we see that the birth rate does not continue to rise, but begins to decline after 10 or 15 years. The rate of population growth does not continue to rise after a decade, but stabilizes at about 2.6 percent. The size of the surviving family, nevertheless, continues to rise because parents are using unreliable means of birth control; family size increases by 17 to 22 percent after 40 years. Clearly, better birth control, more birth spacing, and a reduction in the number of surviving children parents actually want would all contribute to a more substantial and rapid reduction in fertility and population growth.

This simple simulation exercise has suggested how information derived from micro analysis of family and aggregate data can be used to interpret the aggregate phenomena described by Professor Davis. This simple model predicts declines in age-specific fertility which are very similar to those now occurring in the more rapidly developing countries such as Taiwan. This interpretation of the "changing balance of births and deaths" does not treat births and deaths as independent of one another, nor does it imply that income or urbanization are particularly useful indices for the social and economic systems that determine desired fertility.

Professor Davis adopts the profoundly pessimistic viewpoint in his paper that there is little basis for anticipating a decline in crude birth rates in the Third World until economic development, industrialization and urbanization in these countries reaches the advanced levels achieved in Taiwan and Puerto Rico. But beneath the national vital rates discussed by Davis, variation in reproductive behavior among individuals and groups in low income societies appears to be responding to changing environmental incentive patterns. Diversity and change are already present although estimated national crude birth rates are in many cases seemingly stationary. A growing body of evidence indicates that improvements in child nutrition and local health facilities, say in India, might reduce infant and child mortality with the secondary effect of reducing birth rates substantially within a decade. Modification of education, employment and welfare policies might further change elements in the family setting that would accelerate the short-run shift in parental demands toward a smaller surviving family size goal. Finally, a program that reduces the search and use costs to all individuals, particularly the poor and disadvantaged, of reliable modern birth control may markedly hasten the spread of this new technological innovation and reduce in the short run the rate of population growth.

Economic development measured in terms of increasing per capita income is a frustratingly slow process. But with the current structure of development, partial solutions to the imbalance of births and deaths are in prospect in the short run. Additional solutions to the population problem will be illuminated by research aimed at understanding why reproductive behavior differs across families. I am sanguine that

some of these suggested solutions will require only a modest and socially acceptable reordering of existing social and economic development objectives in the Third World.

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4. Coale, Ansley J. and Paul Demeny, Regional Model Life Tables and Stable Populations. Princeton, N. J.: Princeton University Press, 1966. Table XIII, p. 30.